White Paper
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Sustaining Cultural Heritage Collections
Furnishing Sustainable Photography Storage
Project Director: Brett Abbott, Director of Collections and Exhibitions
Amon Carter Museum of American Art
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Project Background
Furnishing Sustainable Photography Storage helped the Amon Carter Museum of American Art create new preservation capacity for the stewardship of our renowned collection of American photography. With holdings of over 45,000 exhibition-quality prints by more than 450 photographers, and more than 220,000 negatives, transparencies, and artists' work prints, the Amon Carter's collection encompasses the full history of photography, from 1839 to the present day.

As part of a major museum expansion from 1999-2001, the Amon Carter engaged Scientific Climate Systems to design and construct a cold storage facility for its photography collection as part of an institution-wide building expansion. Recognizing the growth patterns of our photography collection, the museum additionally insulated 1600 square feet of floor immediately adjacent to the photography vault to facilitate a future vault expansion. To save space, vault mechanicals were placed in a sub-basement immediately below the vaults.

Support from the National Endowment for the Humanities allowed the Amon Carter to address three critical preservation issues brought on by changes in the field of photography and the aging of our storage facility:

1) **Expanding inadequate cold storage capacity brought by the shift from analogue to digital photography.** As artists increasingly embraced color photography and new inkjet printing techniques, the museum's digital color photography and inkjet holdings rapidly expanded following the opening of the previous vault 2001. Working from digital files, artists began creating larger and larger prints, and it became common for acquisitions of contemporary photography to be physically larger than the museum's storage furniture could accommodate. Because cold storage can prevent fading and degradation of color and inkjet prints for hundreds of years longer than cool storage, which is appropriate for black-and-white gelatin silver prints, the Amon Carter's cold room (initially designed at less than one-third the size of our cool room) had exceeded its capacity by 2015.
2) **Installing art racks for oversized in the photography vaults.** Within the vault's original design, the museum recognized that we would not be able to fit racks in the cool room to house our oversized gelatin silver photographs and, after consulting with photography preservation scientists, we decided to store our oversized black-and-white photographs on racks in our vault designated for paintings, sculpture, and other works on paper (maintained at 70°F and 50%RH). While temporarily stable, the museum required additional storage capacity to preserve our existing collection in ideal conditions.
3) **Moving, replacing, and upgrading the mechanicals servicing the photography vault.** With the existing climate-controlling mechanicals running virtually uninterrupted since 2001, the continued sustainable operation of the vault required new and more energy-efficient frequency. The larger mechanicals required to cool the expanded vault needed to be relocated from a difficult to access sub-basement to a newly constructed utility room.

Project Activities
With support from the National Endowment for the Humanities, the Amon Carter was able to expand our existing photography storage vault, create new compact storage systems designed to arrange the collection by object size and type, and install new, larger and more efficient climate-controlling vault mechanicals by appropriating space from an underutilized exhibition vault, a photography staging area, and offices housing exhibition design and registrars. Critical expansions and upgrades to the museum's photography storage included:

Vault Footprint and Climate

Photography Vault Climate and Approximate Dimensions

Room Conditions and Purpose	Previous	Expanded
Cold Room: 20˚F and 30% Relative Humidity (RH); for color prints and slides, acetate-base negatives, and inkjet prints	522 square feet	2,345 square feet
Vestibule: 40˚F and 35% RH; transitional space where photographs moving out of the cold room for display must reside for at least 24 hours to prevent moisture condensation	77 square feet	179 square feet
Cool Room: 60˚F and 40% RH; for black-and-white silver prints, glass plate negatives, and photographs made by early processes. Photographs moving out of the vestibule reside in cool storage for another 24 hours before being taken out of storage.	1,790 square feet	1,780 square feet

The expanded photography vault utilizes the same recommended climates as the museum's previous configuration with more than four times the footprint for the works in the collection most prone to degradation. Another important expansion more than doubled the size of the transitional vestibule used for the safe staging of works from the cold room to the cool room. Despite the slight reduction in the overall size of the cool room, this space will have greater storage capacity due to a more efficient layout and the installation of a compact storage system.

Walls, Floors, and Mechanicals
The expanded vault was outfitted with ceilings and walls constructed of modular fire retardant, prefabricated galvanized interlocking insulated panels. A portion of the cold room walls previously thought reusable could not be guaranteed to maintain a perfect seal with the new interlocking system and was replaced.

The expansion utilized approximately 1,600 feet of previously-insulted flooring installed in 2001 in preparation for a future expansion. Flooring immediately surrounding the vault walls and columns had to be trenched down in order to install the new locking panels, and the museum used this opportunity to install additional insulation under the new concrete.

A major enhancement of the project was the relocation of the vault mechanicals from a sub-basement to a space immediately adjacent to the vault. The relocation was necessary not only because of the new, larger size of the mechanicals, but also to facilitate greater ease of future maintenance.
Scientific Climate Systems (SCS), the company who created the museum's original vault, was engaged to create the new Munters-based mechanical units to control temperature and

humidity in each room. These units offer technical improvements over the original mechanicals installed in 2001, including improved carbon filtration, increased cooling and dehumidification capacity, increased pressurization of air, and new gauges to allow easier inspection of pressure changes, facilitating on-going maintenance.

The updated mechanicals also provide a significant improvement in the event of a system failure. Previously a system failure would generate an alert via the museum's Metasys monitoring system. Once alerted, emergency protocol required staff to enter the vault and place rubber mats over all return ducts in order to prevent the loss of the controlled environment. The new system actuators will automatically seal shut in the event of failure, greatly extending the climatized environment in both the cold and cool rooms.

Furniture

Photography Vault Furniture Additions

Room	Previous	Expanded
Cold Room	· Cabinets for small prints: 4 · Flat files drawers for medium works: 20 · Flat file drawers for large works: 8 · Linear feet shelving for negatives, photographic archives, library special collection books: appx 120' · Linear feet of racks for framed photographs and oversize works: none · Flat storage shelving for large inkjet prints: none	· Cabinets for small prints: 9 · Flat files drawers for medium works: 84 · Flat file drawers for large works: 16 · Linear feet shelving for negatives, photographic archives, library special collection books: ~230' · Total linear feet of 7' tall racks for framed photographs and oversize works: ~475' · Flat storage shelving for large inkjet prints: 64 shelves
Cool Room	· Cabinets for small prints: 64 · Flat files drawers for medium works: 60 · Flat file drawers for large works: 8 · Linear feet shelving for negatives, photographic archives, library special collection books: ~550' · Linear feet of racks for framed photographs and oversize works: none	· Cabinets for small prints: 80 · Flat files drawers for medium works: 70 · Flat file drawers for large works: 8 · Linear feet shelving for negatives, photographic archives, library special collection books: ~700' · Total linear feet of 7' tall racks for framed photographs and oversize works: 500'

The museum was able to create additional capacity through the installation of compact storage furniture through the vault. All existing photography storage furniture was retrofitted to fit on hand-operated collapsable carriage racks and supplemental units were installed. A new furniture tracking system was installed in both the cool and cold rooms, which had to be

embedded within two inches of frost-resistant concrete flooring. The new tracking system also accommodated the addition of 32 total art racks for oversized works.

Fire Suppression
As part of the cold room expansion, the museum installed an aspirating smoke detection system, VESDA, designed to detect the pre-combustion stage of a fire in extreme low temperatures. In addition, all refurbished and new furniture was outfitted with water-shedding canopies to protect the collection against deployment of the fire sprinkler system.

Monitoring and Facilities oversight
Digital recorder-controllers previously located inside the vault were moved immediately outside the vault entrance. Controls allow ongoing and long-term monitoring of current and ongoing temperature and humidity conditions in each space. Updates to the vault climate monitoring system can now offer remote digital access to vault conditions and reports to the museum's collections staff. As with the previous system, controls also tie to an electronic JCI Metasys Building Automation System for remote 24/7 monitoring by the museum's security and facilities staffs.

Additional Improvements
LED lighting with a 3,000K color temperature was installed throughout the vault for even and efficient lighting. Digital display readouts of vault conditions were installed in each vault room. The museum also installed an illuminator central inverter system which creates an instant lighting failsafe in the event of a blackout so that no museum staff will have to endure a precarious power outage while handling art.

Accomplishments
Furnishing Sustainable Photography Storage enabled the Amon Carter to successfully address the three main preservation challenges facing its world-renowned photography collection by expanding cold storage capacity; installing art racks within the vaults; and upgrading the vault mechanical units.

1) With the expanded footprint in the cold storage facility, the museum has created more than four times the previous storage capacity for color photography and inkjet photographic prints. The addition of compact storage to the expanded cold storage vault has allowed the museum to create adequate storage for an estimated 20 years of collection growth, able to house approximately 1,500 small prints (matted size of less than 24x30"); 640 medium prints (24x30" to 36x48"); 64 large works (36x48" to 50x60") and roughly double the space for oversize prints and double the space for negatives, photographic archives, and library special collection books.

   In addition to the space to acquire new works of contemporary photography, the expansion also provides the museum with greater future flexibility for all photography acquisitions. Black-and-white gelatin silver prints and 19th-century historical collections can safely be stored within the cold room should the museum need to exceed the current cool room capacity. Cold storage can provide an ideal preservation condition as new technologies in photography evolve and artists experiment with hybrid processes.

2) Within the rearranged cool room and expanded cold room, the museum was able to install art racks with over 900 linear feet of storage for oversize prints.

a) **Cool room – 13 double-sided 19' long racks (500 linear feet)**
These racks will accommodate the entirety of the museum's 1978 Richard Avedon commission *In the American West*, providing the collection with optimal preservation conditions for the first time. A modest capacity will remain for additional oversize black and white acquisitions, approximately 10% of the overall addition.

b) **Cold room – 19 double-sided 12-13' long racks (475 linear feet)**
These racks will accommodate all of the museum's existing oversize color and inkjet prints while retaining approximately 50% of the addition for new acquisitions.

3) The museum created a new utility room along a shared wall with the photography vault in order to relocate the climate-controlling vault mechanicals from their previous location in a difficult-to-access subbasement. The new units provide significant upgrades needed to more efficiently cool and control humidity within the expanded vault. Enhanced failsafe technology in the new mechanicals will help to maintain ideal preservation conditions in the event of an emergency.

Long-Term Impact
Support from the National Endowment for the Humanities for *Furnishing Sustainable Photography Storage* empowered the Amon Carter to address two significant strategic objectives:

1) **Addressing the long-term financial sustainability of the museum's operations.** While investment in the long-term health of photography collection came at significant expense, addressing the museum's preservation needs now will help avoid major expenses of emergency repairs and external storage solutions to accommodate new acquisitions. Updates to aging mechanicals will further save the museum costly maintenance in the coming years and increase the energy efficiency of the cold storage vault operations.
2) **Offering a physical environment that leads to long-term community engagement, ensures high standards of collection care, and allows visitors and staff to navigate the buildings and grounds.** The photography vault expansion will ensure the highest quality care for our collection for at least two decades. The project addressed the museum's most pressing infrastructure need by building from the existing physical assets of the current photography vault and original insulated flooring to allow for expansion. In addition, the enhancements will help cultivate increased public engagement with the museum's photography collection, which serves an audience ranging from first-time visitors to art enthusiasts; and provides a rich educational resource for the museum's extensive Pre-K-12 student programs; for our adult and family education programs; and for art historians and other researchers studying the museum's holdings.

Furnishing Sustainable Photography Storage will improve the preservation of one of the country's most culturally significant photography collections and allow the Amon Carter to continue building a photography collection of the highest artistic and historic importance. Together with the museum's onsite photography conservation lab and endowed Photography Conservatorship and Fellowship program, the vault expansion will allow the Amon Carter will continue to provide leading collections care in the field of photography.